

What is claimed is:

1. A method of making a finished thin-walled metal container using a high-strength alloy, comprising the steps of:

- (a) providing a metal slug;
- (b) impact extruding said metal slug to form a cylindrical cup having a base with a base thickness, walls with an outer diameter and wall thickness, and an open end opposite said base, said base thickness of said cup being about the thickness of the base of the finished container and said outer diameter being at least about 10% larger than the outer diameter of the finished container;
- (c) drawing said impact extruded cup through at least one drawing die to reduce said outer diameter to about the outer diameter of the finished container without substantially reducing said wall thickness of said extruded cup; and
- (d) wall ironing said drawn cup through at least one wall ironing ring to reduce said outer diameter and said wall thickness of said drawn cup to the outer diameter and wall thickness of the finished container.

2. The method of claim 1, further comprising the step of heating the metal slug prior to said impact extrusion step.

3. The method of claim 1, wherein said metal slug is made of an aluminum alloy selected from the group consisting of: 3002, 3102, 3003, 3103, 3203, 3004, 3104, 3204, 3005, 3105, 3006, 3007, 3107, 3307, 3009, 3010, 3011, 3012, 3013, 3014, 3015, 3016, 3017, 3019, 3020, 3025 and 3030 aluminum alloys.

4. The method of claim 1, wherein said metal slug is made of a 6000 series aluminum alloy.
5. The method of claim 1, wherein said metal slug is disk-shaped, having a diameter that is about 0.35 mm smaller than the outer diameter of the impact extruded cup and a thickness of about 2.0 mm to about 4.0 mm.
6. The method of claim 1, wherein said metal slug is further provided with a domed shape.
7. The method of claim 1, wherein said impact extruded cup has an outer diameter that is about 15% to about 25% larger than the outer diameter of the finished container.
8. The method of claim 1, wherein said impact extruded cup has a base thickness of about 0.4 mm to about 0.8 mm, an outer diameter that is about 18% larger than the outer diameter of the finished container, and a wall thickness of about 0.2 mm to about 0.6 mm.
9. The method of claim 1, wherein said impact extruded cup further comprises a transition between said base and said walls, said transition being a circular curve with a radius of about 3.0 mm to about 8.0 mm.

10. The method of claim 1, wherein said base of said impact extruded cup comprises a flat central portion with a conical outer ring, said conical outer ring having an angle of about 1° to about 15° relative to said central portion.

11. The method of claim 1, wherein said drawing step further comprises forming a conical taper in said wall of said drawn cup adjacent said base.

12. The method of claim 11, wherein said conical taper has an angle of about 0.5° .

13. The method of claim 1, further comprising the step of inserting said drawn cup into at least one bottom forming die to form the base of said drawn cup into the shape of the base of the finished container.

14. The method of claim 1, wherein the wall of said wall ironed container further comprises a first wall thickness adjacent said base, a second wall thickness distal to said base, and a conical taper forming a transition between said first and second wall thicknesses.

15. The method of claim 14, wherein said first and second wall thicknesses are about 0.2 mm to about 0.4 mm, said second wall thickness being greater than said first wall thickness, and said conical taper has an angle of about 0.5° .

16. The method of claim 15, wherein said conical taper begins about 90 mm from the base of the wall ironed cup.

17. The method of claim 1, further comprising the step:
 - (e) trimming said open end of said wall ironed container to form a smooth even edge.
18. The method of claim 17, wherein about 10 mm to about 20 mm is trimmed from said open end of said wall ironed container.
19. A method of making a finished thin-walled metal container using a high-strength alloy, comprising the steps of:
 - (a) providing a disk-shaped metal slug;
 - (b) impact extruding said metal slug to form a cylindrical cup having a base with a base thickness, walls with an outer diameter and wall thickness, and an open end opposite said base, and wherein said base comprises a flat central portion with a conical outer ring, the angle of said conical ring ranging from about 1° to about 15° relative to said central portion, said base thickness of said cup being about the thickness of the base of the finished container and said outer diameter being at least about 10% larger than the outer diameter of the finished container;
 - (c) drawing said impact extruded cup through at least one drawing die to reduce said outer diameter to about the outer diameter of the finished container, without substantially reducing said wall thickness of said extruded cup;
 - (d) inserting said drawn cup into at least one bottom forming die to form the base of said drawn cup into the shape of the base of the finished container;

(d) wall ironing said bottom formed cup through at least one wall ironing ring to reduce said outer diameter and said wall thickness of said drawn cup to the outer diameter and wall thickness of the finished container; and

(e) trimming said open end of said wall ironed container to form a smooth even edge.

20. The method of claim 19, further comprising the step of heating the metal slug prior to said impact extrusion step.

21. The method of claim 19, wherein said metal slug is made of an aluminum alloy selected from the group consisting of: 3002, 3102, 3003, 3103, 3203, 3004, 3104, 3204, 3005, 3105, 3006, 3007, 3107, 3307, 3009, 3010, 3011, 3012, 3013, 3014, 3015, 3016, 3017, 3019, 3020, 3025 and 3030 aluminum alloys.

22. The method of claim 19, wherein said metal slug is made of a 6000 series aluminum alloy.

23. The method of claim 19, wherein said metal slug has a diameter that is about 0.35 mm smaller than the outer diameter of the impact extruded cup and a thickness of about 2.0 mm to about 4.0 mm.

24. The method of claim 19, wherein said metal slug is further provided with a domed shape.

25. The method of claim 19, wherein said impact extruded cup has an outer diameter that is about 15% to about 25% larger than the outer diameter of the finished container.

26. The method of claim 19, wherein said impact extruded cup has a base thickness of about 0.4 mm to about 0.8 mm, an outer diameter that is about 18% larger than the outer diameter of the finished container, and a wall thickness of about 0.2 mm to about 0.6 mm.

27. The method of claim 19, wherein said impact extruded cup further comprises a transition between said base and said walls, said transition being a circular curve with a radius of about 3.0 mm to about 8.0 mm.

28. The method of claim 19, wherein said drawing step further comprises forming a conical taper in said wall of said drawn cup between said base thickness and said wall thickness.

29. The method of claim 28, wherein said conical taper has an angle of about 0.5°.

30. The method of claim 19, wherein the wall of said wall ironed container further comprises a first wall thickness adjacent said base, a second wall thickness distal to said base and a conical taper forming a transition between said first and second wall thicknesses.

31. The method of claim 30, wherein said first and second wall thicknesses range from about 0.2 mm to about 0.4 mm, said second wall thickness being greater than said first wall thickness, and said conical taper has an angle of about 0.5° .

32. The method of claim 31, wherein the conical taper begins about 90 mm from the base of the wall ironed cup.

33. The method of claim 19, wherein about 10 mm to about 20 mm is trimmed from said open end of said wall ironed container.

34. A method of making a finished thin-walled metal container using a high-strength alloy, comprising the steps of:

(a) providing a disk-shaped metal slug having a thickness of about 2.0 mm to about 4.0 mm;

(b) impact extruding said metal slug to form a cylindrical cup having a base with a base thickness, walls with an outer diameter and wall thickness, and an open end opposite said base, said base comprising a flat central portion with a conical outer ring, the angle of said conical ring being about 1° to about 15° relative to said central portion, said base thickness being about 0.4 mm to about 0.8 mm, said wall thickness being about 0.2 mm to about 0.6 mm, and said outer diameter being at least about 10% larger than the outer diameter of the finished container;

(c) drawing said impact extruded cup through at least one drawing die to reduce said outer diameter to about the outer diameter of the finished container, without substantially reducing said wall thickness of said extruded cup;

(d) inserting said drawn cup into at least one bottom forming die to form the base of said drawn cup into the shape of the base of the finished container;

(d) wall ironing said bottom formed cup through at least one wall ironing ring to reduce said outer diameter and said wall thickness of said drawn cup to the outer diameter and wall thickness of the finished container; and

(e) trimming about 10 mm to about 20 mm from the open end of said wall ironed container to form a smooth even edge.

35. The method of claim 34, further comprising the step of heating the metal slug prior to said impact extrusion step.

36. The method of claim 34, wherein said metal slug has a diameter that is about 0.35 mm smaller than the outer diameter of said impact extruded cup and a thickness of about 2.0 mm to about 4.0 mm.

37. The method of claim 34, wherein said metal slug is further provided with a domed shape.

38. The method of claim 34, wherein said impact extruded cup has an outer diameter that is about 15% to about 25% larger than the outer diameter of the finished container.

39. The method of claim 34, wherein said impact extruded cup has an outer diameter that is about 18% larger than the outer diameter of the finished container.

40. The method of claim 34, wherein said metal slug is made of an aluminum alloy selected from the group consisting of: 3002, 3102, 3003, 3103, 3203, 3004, 3104, 3204, 3005, 3105, 3006, 3007, 3107, 3307, 3009, 3010, 3011, 3012, 3013, 3014, 3015, 3016, 3017, 3019, 3020, 3025 and 3030 aluminum alloys.

41. The method of claim 34, wherein said metal slug is made of a 6000 series aluminum alloy.

42. The method of claim 34, wherein said impact extruded cup further comprises a transition between said base and said walls, said transition being a circular curve with a radius of about 3.0 mm to about 8.0 mm.

43. The method of claim 34, wherein said drawing step further comprises forming a conical taper in said wall of said drawn cup adjacent said base.

44. The method of claim 43, wherein said conical taper has an angle of about 0.5°.

45. The method of claim 34, wherein the wall of said wall ironed container further comprises a first wall thickness adjacent said base, a second wall thickness distal to said base and a conical taper forming a transition between said first and second wall thicknesses.

46. The method of claim 45, wherein said first and second wall thicknesses range are about 0.2 mm to about 0.4 mm, said second wall thickness being greater than said first wall thickness, and said conical taper has an angle of about 0.5° .

47. The method of claim 46, wherein said conical taper begins about 90 mm from the base of the wall ironed cup.